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Governance Decentralization and Local Infrastructure Provision in Indonesia

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ABSTRACT

This paper examines the recent decentralization of governance in Indonesia and its impact on local infrastructure provision. The decentralization of decisionmaking power to local jurisdictions in Indonesia may have improved the matching of public infrastructures provision with local preferences. However, decentralization has made local public infrastructures depend on local resources. Due to differences in initial endowments, this may result in the divergence of local public infrastructures in rich and poor jurisdictions. Using data from village-level panel surveys conducted in 1996, 2000, and 2006, this paper finds that (1) local public infrastructures depend on local resources, (2) decentralization has improved the availability of local public infrastructures, (3) local jurisdictions are converging to a similar level of local public infrastructure, and (4) to some extent, decentralized public infrastructures' provision reflects local preferences.

Keywords: decentralization, local public goods, Indonesia

1. INTRODUCTION

Decentralization refers to the devolution of decisionmaking power on local policies to the elected local-level authorities of the relevant localities. With the fall of planned economies and centralized states, the decentralization of governance and the delivery of public goods by local authorities have taken center stage in many of the policy experiments favored by development agencies and donor communities (World Bank 1999). Following an economic and financial crisis, Indonesia embarked on the path to decentralization in the late 1990s. In this paper, we examine whether the decentralized provision of public goods in Indonesia reflects local preferences, and whether public goods provision differs between rich and poor localities.

Decentralized services can be a means of achieving allocatable efficiency because the provided goods can better reflect the preferences of the service users, while service costs can be reflected in a user fee for such services. Under the assumption of uniform expenditure, Oates (1972) found that decentralization is preferable to centralized provision, given heterogeneous tastes and no spillovers, since local governments can tailor local public goods to local tastes. In contrast, when spillovers are present and there is no heterogeneity in taste, centralized provision is more efficient.[1] This is usually referred to as the "preference-matching hypothesis."

Decentralized services can also be a means of achieving productive efficiency.[2] Seabright (1996) and Persson and Tabellini (2000) show that under certain conditions, decentralization can improve productive efficiency by reducing corruption, waste, and public fund leakage. Bardhan and Mookherjee (2000, 2005, 2006) emphasized the limited accountability of bureaucrats under centralized systems and the possibility of elite capture under decentralized systems. Under the assumption that public goods could be pro-poor or pro-rich, the authors focused on the efficiency and equity of public goods provision under alternate financing arrangements. They found that decentralization, accompanied by local-level financing, makes local public goods dependent on local resource availability, leading to the possibility of divergence in the amount of local public good available in rich versus poor localities. This is referred to as the "divergence hypothesis."

In this paper, we use village-level panel data to test the preference-matching and divergence hypotheses in the context of Indonesian decentralization. We test the hypotheses by asking two questions: first, has the decentralized provision of public infrastructures reflected local preferences? Since the provided public infrastructures are chosen at the local level under decentralization, the preference-matching hypothesis indicates that such provision should reflect the needs and preferences of the local citizens. Second, has decentralization led to divergence in the amount of local infrastructures available in rich versus poor localities? Under decentralization, investment in local public infrastructures depends largely on local resources. The divergence hypothesis predicts that differences in local resource endowments across localities may lead to differences in public infrastructure investment.

Three distinct characteristics make Indonesia an attractive test case for examining the two research questions at hand: (1) the relative exogeneity of the decentralization experiment; (2) large variations in the availability of resources among local government jurisdictions; and (3) the availability of both pre- and post-decentralization data on local public infrastructures (discussed in more detail in Section 4).

In Indonesia, the decision to decentralize was exogenous to the local authorities, and the implementation of decentralization was relatively quick; rather than employing gradualism, the decisionmakers used a "big bang" approach. The reform agenda, which was formulated by multilateral

[1] Subsequent political economy models, such as those of Lockwood (2002) and Besley and Coate (2003), relaxed the assumption of uniform provision under a centralized system, and modeled public spending under centralization as being determined by a legislature of locally elected representatives. These studies showed that preference matching is reduced under centralization, even when regional delegates represent the interests of the voters in their electing regions.

[2] See Prud'homme (1995) for opposite views.

donors and development agencies following the Asian financial crisis, paved the devolution of fiscal and political authority from the central government down to the districts.[3]

Large variations in initial local resource availability/potential among local government jurisdictions, along with incomplete fiscal equalization transfer, also contribute to making Indonesia an attractive test case for the current research. In 2000, prior to the implementation of decentralization, the per capita income in the top 20 percent of the districts was three times more than that in the bottom 20 percent of the districts. Similarly, the poverty rates differed significantly among local jurisdictions.[4] Although a conditional intergovernmental transfer program based on the fiscal needs was formulated to address these differences, fiscal equalization was incomplete and fiscal disparities persist among the local government jurisdictions. Even with the equalization transfers, the richest district has roughly 70 times more per capita revenue than the poorest district (Eckardt and Shah 2006).

Our work complements the theoretical literature on preference matching (Oates 1972 and subsequent papers) as well as the growing body of theoretical literature that focuses on the links among decentralization, accountability, elite capture, and the welfare of the poor (see, for instance, Bardhan and Mookherjee [2006] and references therein). Although early theoretical studies on these matters emphasized the trade-off between the uniformity of service delivery under centralization versus issues of uneconomic scale and cross-regional externalities under decentralization, more recent studies have emphasized the limited accountability of local government officials, and the risk of capture by local elites and interest groups. There is currently an ongoing debate regarding the relative responsiveness of centralized versus decentralized delivery of public goods. Here, we seek to test this empirically.

The existing empirical studies on decentralization primarily examine the issue at the cross-national level (for example, Estache 1995; Huther and Shah 1998; Fishman and Gati 2001; Mello and Barenstein 2001; Treisman 2002; Khaleghain 2003), where decentralization is usually measured by the percentage of government expenditure or the taxes collected at the subnational level.[5] However, given that there is substantial heterogeneity in the decentralization frameworks seen across various countries, the use of these measures as proxies of decentralization may not be accurate. Similarly, the commonly used outcome measures, such as corruption or immunization, may not reflect the true outcomes of decentralization processes. Fortunately, recent decentralizations in Indonesia and other developing countries can bring useful and complementary evidence utilizing within-country variations.

Three previous empirical works bear some resemblance to the present study. First, Foster and Rosenzweig (2001) examined how democratization affected the interests of the poor in India. Second, Faguet (2004) examined how decentralization increased preference matching in local communities in Bolivia; however, local spending was entirely grant-financed and decentralization was accompanied with redistribution in this case, and these issues were not separated for analysis. Finally, Barankay and Lockwood (2007) reported on the productive efficiency associated with decentralization in the context of education provision in Swiss cantons.

The remainder of this paper proceeds as follows: Section 2 provides a brief description of the decentralization process in Indonesia. Section 3 describes the empirical approach, which maps initial local incomes and preferences to subsequent allocations for local public goods during the pre- and post-decentralization periods, then estimates growth equations that characterize changes in infrastructure as conditional on its initial-stage availability. Section 4 describes the data used to construct the village-level panels for the two periods (pre- and post-decentralization). Section 5 describes our empirical results on the impact of local incomes and preferences on public goods provision during the pre- and post-decentralization periods. Section 6 concludes with a discussion of some possible policy implications.

[3] Through the enactment of Law 22/1999 on regional governance, the responsibility for many government expenditures was decentralized to the local (district) governments.

[4] The poverty figures for the top and bottom quintiles of the districts in 1999 were 8.53 percent and 43.07 percent, respectively. Authors' calculation is based on Bureau Pusat Statistics (BPS) data.

[5] Both Faguet (2004) and Barankay and Lockwood (2007) provide summaries of recent empirical studies, highlighting their limitations.

2. DECENTRALIZATION IN INDONESIA

Indonesia is comprised of 33 provinces, which are divided into districts (*kabupaten*) and cities. The districts are divided into subdistricts, which are further divided into villages (*desa*). The recent decentralization entrusted the *kabupaten* and *desa* with the responsibility of providing public goods. Both district and village heads are elected by popular vote, while each subdistrict (*kecamatan*) is headed by a civil servant who reports to the district head.

From the Dutch colonial era until decentralization, Indonesia was governed by a centralized system in which the local governments mostly functioned to implement policies and programs that were designed by the central government. In 1999, however, immediately after the financial crisis, the government embarked on a drastic reform path, devolving the responsibility for many government expenditures to the district governments through fiscal and political decentralization. This process endowed the district governments with additional fiscal resources, human resources, authorities, and responsibilities. The transition was implemented in 2001 under tight deadlines.[6]

Two of the main cornerstones of Indonesian decentralization were Law 22/1999 on governance and Law 25/1999 on fiscal relations. Law 22 devolved all governance functions from the central government to the local authorities, with the exceptions of national defense, international relations, justice, police, monetary policy, development planning, religion, and finance. Law 22 also made the local governments responsible for the provision of healthcare, education, and environmental and infrastructure services. The local governments were also given leeway to perform any other function not explicitly reserved for the central government.

Similarly, but in the context of fiscal relations, Law 25 significantly strengthened the local governments' shares in government spending. For example, the expenditure share of regional governments in overall public expenditures increased from about 17 percent in 2000 to over 30 percent after 2001. In addition, decentralization also reassigned approximately two-thirds of the central governments' civil servants to the local governments. Presently, local governments employ over three-quarters of the civil servants in Indonesia.

Beginning in 1999, sweeping legislative and administrative changes in local governments brought momentous changes to decisions on the selection and financing of local public infrastructures and goods. Following the decision to decentralize, the central government quickly delegated virtually all responsibility for urban and rural infrastructure services to the local governments (Peterson and Muzzini 2005). In 2002, local governments financed 44.3 percent of transportation development, 21 percent of healthcare and social services, and 16 percent of education development (Eckardt and Shah 2006). Needless to say, transportation infrastructure, healthcare, and education together constitute the major expenditure outlay for local governments.

At the local level (*desa*), which is the focus of our empirical analysis, local public goods are planned for and provided as follows. Each village has an elected local government body that prepares an annual allocation plan of expenditures on local public goods. This plan is subject to approval at a general meeting attended by all members of the village. In order to finance such a plan, the village governing body must raise at least 30 percent of the proposed expenditure from the village residents through user's fees or similar mechanisms. Once the plan and the financing methods are approved, the village governing body brings the proposal to the district local government. All else being equal, the higher the village-level financial contribution and the district-level resource availability, the higher the likelihood that the local public goods in question will be financed. Presently, although the central government distributes grant subsidies to the local governments, fiscal equalization remains incomplete. This is largely because the equalization formula is still driven by historical allocations (including wages), and local governments are subject to significant disparities in per capita expenditures (Hofman and Kaiser 2006).

[6] By law, all implementing regulations were to be prepared within a year from approval, and the laws had to be implemented by May 2001 (Hofman and Kaiser 2006).

3. EMPIRICAL APPROACH

We herein follow a parametric approach that focuses on the relationship between initial village resources and preferences, and the subsequent stock of local public infrastructures. This approach allows us to map changes in local public infrastructures (for example, improvement, no change, or deterioration) with regard to local resource availability and preferences in the pre- versus post-decentralization periods.

The main specification is

$$\Delta INF_{\mathrm{i}} = \alpha + \beta \cdot INC_{0,i} + \varphi \cdot INF_{0,i} + Z_i'\delta + \varepsilon_i. \quad (1)$$

The change in infrastructure stocks between the two periods in village i, ΔINF_i, is defined as a categorical variable and is our primary variable of interest. The initial measure of local resources, $INC_{0,i}$, is the initial period resource availability for *desa i*, where "0" means the initial period; this is one of the primary explanatory variables. We expect that its coefficient, β, will equal zero in a centralized regime and become positive under a (partly) user-financed decentralized regime, such as that seen in Indonesia. In addition, village characteristics (for example, population, the existence of a port, and topography) are included in Z_i as further controls.

For ΔINF_i, we consider changes in three local public infrastructures. Ideally, public infrastructure stocks should be measured in quality-adjusted units of output. Since such information is not available for Indonesia, we herein examine three types of infrastructure (roads, schools, and healthcare services), assuming that the infrastructures are homogeneous within a particular type but heterogeneous across types. The first measure of local public infrastructure considered herein is a change in village roads (those connecting a village with the regional road network) over two time periods, one prior to decentralization and after decentralization. As discussed in Section 2, after the devolution of power, the financing and maintenance of this type of road fell under the purview of local authorities. Intuitively, we expect that rich villages will be likely to invest in more roads and maintain them better compared to poor villages. However, investment in roads could be endogenously determined, since the initial stock of village roads may affect the village's current income and subsequent road investments. We account for this by incorporating $INF_{0,i}$, which indicates the infrastructure stock for village i in period 0. The second measure of local public goods considered here is a change in school availability (the presence or absence of both primary and junior high schools in the village). We follow a specification similar to that described for the road measure, and we might intuitively expect that it should follow the same rationale. Finally, the third measure of local public goods considered herein is a change in healthcare infrastructure, namely whether a village possesses a polyclinic or *puskesmas* (community health center), which are the two types of primary healthcare facilities found in Indonesia.

As noted in Section 2, the three public infrastructures considered herein (roads, healthcare services, and education) typically constitute the major expenditures for local governments in Indonesia. Here, we compare the changes in these measures between two time points within the pre-decentralization period (1996 and 2000) with changes occurring between two time points under decentralization (2000 and 2006). In this way, we examine how changes between 1996–2000 and 2000–2006 are linked to local income and local preferences (discussed below) under the two different regimes.

For the availability of local resources (*INC*), the proportion of households living in poverty is used as a measure of resource availability. The exact definition and construction of the variable is discussed further in the next section. We assume that in a user-financed decentralization program, such as that seen in Indonesia, the proportion of village households living in poverty determines the village's aggregate ability to finance local public goods. We address the issue of endogeneity by taking lagged income as a control variable.

In estimating equation (1), there are a few important issues to note. First, decentralization was implemented at the district level, so observed and unobserved investment behavior may differ across districts. For instance, richer districts had more initial resources and the transfers from the central government did not eliminate the resource gap between rich and poor districts (Eckardt and Shah 2006).

To address this, we add district-fixed effects that allow us to examine how interdistrict inequality, including unobservables, affected public good investment behavior in both periods. Since we assume that investment behavior is more homogeneous within a district than across districts, we consider district-fixed effects to be a reasonable proxy.

Second, there may be correlation between initial village conditions and subsequent infrastructure investments. Although all local jurisdictions should theoretically have equal infrastructure stocks under a centralized regime, this was not the case in reality. Furthermore, well-endowed localities are not only likely to have good initial infrastructure, they were more likely to invest in new infrastructures or improvements in existing infrastructures. This positive correlation may create an upward bias in the estimated effect of initial infrastructure condition on subsequent infrastructure investments.

Third, resource constraints and the demand for services may differ across different types of infrastructures and jurisdictions, and these factors can change the parameters of interest. For example, the demand for roads can depend on the economic activities in a given village, which is correlated with the initial income level and other factors. This makes it difficult to distinguish between resource constraints and demand heterogeneity. However, if the demand parameters are stable between the pre- and post-decentralization periods, between-period comparison of the studied parameters should enable us to identify the role(s) of resource constraints (the related issues of economic and financial crisis are discussed later in this section).

For the preference heterogeneity within a village (*PRE*), we consider the gender of the *desa* head, his/her education, age, and tenure. The usual assumption is that the preference of village heads reflects the voters' preferences. This gives us the following specification:

$$\Delta INF_{\mathrm{i}} = \alpha + \gamma \cdot PRE_{0,i} + \beta \cdot INC_{0,i} + \varphi \cdot INF_{0,i} + Z_i'\delta + \varepsilon_i. \quad (2)$$

While specification (1) allows us to examine the impact of local income on local public goods, specification (2) allows us to test whether decentralized provision is responsive to local preferences.

We examine the roles of the village head's characteristics (age, gender, education, and tenure) and, in some years, the gender composition of the voters in the *desa*. The latter measure could correlate with economic activities in the *desa*, since migration opportunities can change the voter composition. In equation (2), we mitigate this potential bias by controlling for the initial income and infrastructure conditions.

In addition to the issues discussed above, we must also be aware of the exogeneity of the community preference measure, which may be correlated with unobserved components of infrastructure condition. However, the above equation examines changes in infrastructures over time, not at a given time point, which mitigates this possibility.

One issue not discussed so far is the macro shock of the economic crisis that took place in 1997–1998. This major shock affected many communities and districts across all regions of Indonesia. Therefore, it is not unrealistic to assume that the effects of the shock were randomly distributed, and there is no reason to believe, a priori, that there was any systematic relationship between the shock and local resource availability. Even if the shock had different effects on different districts, such differences should not matter for our estimation, so long as they were not systematically correlated with the initial infrastructure conditions of the centralized regime. However, if the macro shocks and the recovery of public good investments were heterogeneous across districts and correlated with the initial income level, the macro shock could create a bias in our estimates. To solve this problem, we include district-fixed effects in all estimations.

A more serious concern is the dynamic impacts of the financial crisis on infrastructure investments during the period of 2000–2006. The shock affected urban sectors more severely than it did rural sectors, meaning that villages and districts linked to urban sectors may have been adversely affected. This could create between-district heterogeneity in the dynamics of infrastructure investment. Although we cannot fully negate this issue in our framework, we assess the magnitude of this problem by including the change in district output (that is, the annual growth in gross regional domestic product [GRDP])

instead of using the district-fixed effects. This change allows us to see whether investments in local public goods, when other factors are controlled for, are linked to local economic recovery.

4. DATA

The data for this study come from the *Potensi Desa/Kelurahan Survey* (Village Potential Statistics, henceforth called PODES) that is periodically conducted by Indonesia's Central Bureau of Statistics (BPS).[7] PODES contains detailed information on the public infrastructure stock in a surveyed village, along with the village's characteristics, geography and topography, and the natural disaster(s) faced by the village in recent years.

We use three rounds of PODES (1996, 2000, and 2006), and match localities across the survey rounds for the pre- and post-decentralization periods. Since decentralization started in 2001, we use the first two rounds (1996 and 2000) to assess changes in public goods during the pre-decentralization period, and compare data from the 2000 and 2006 rounds to examine changes due to decentralization.

We match the 1996 and 2000 rounds by village (1) recovering the relevant provinces, districts, and subdistricts from codes that have changed from round to round and construct unique codes for the relevant administrative units, taking into account their mergers and splits. Since we match data based on village names, observations may be missed if the village name changed (for example, during a split). In total, nearly 84 percent of the 1996 villages match between the 1996 and 2000 datasets, and about 81 percent of the 2,000 villages match between the 2000 and 2006 datasets.

The datasets contain information on village roads, schools, and healthcare facilities. Village roads are nonexcludable and non-rival, and externalities are limited within a given village. PODES includes information on the type of *desa* road (soil, hardened, paved, and so forth; Table 1). Since we compare two periods (1996–2000, and 2000–2006), the combination of road variables could take 16 different states. However, we herein distill these combinations to three states: improvement, no change, and deterioration (Table 2). For the measures of school and healthcare infrastructure, we consider changes in the presence or absence of primary and junior high schools, and polyclinics and *puskesmas*, respectively.

For estimation purposes, change in local road (deterioration [for example, from hardened road to soil road], no change, and improvement [for example, from soil road to paved road]) between periods is constructed as a categorical variable (1, 2, and 3, respectively). Similarly, between-period changes in education[8] and healthcare infrastructures are categorized as positive, no change, or negative (1, 2, and 3, respectively). This is conditioned on the initial state (at t-1 period), which appears as a lagged dependent categorical variable. For schools, we also interact the mean distance of schools in the district in the initial period with the initial village condition. For estimation purposes, we use ordered probits with and without the district-fixed effects.

Regarding the explanatory variables, villages are categorized as rich or poor based on the proportion of households living in poverty (pre-prosperous households and prosperous households level I[9]); we assume that the higher the proportion of households in poverty, the lower the availability of resources for public goods. Although transfers from the central government via districts may reduce inequity, there are still cross-community differences in resource availability and constraints, as discussed in Sections 1 and 2. Due to the possibility of endogeneity between income and public goods, we use either a one-period lagged income or the income at the beginning of the period.

[7] The GRDP data come from the World Bank's Jakarta office.

[8] Notably, there was a large decline in the number of primary and junior high schools (Table 1) between 1996 and 2000. It does not seem likely that the entire decline could be explained by underreporting. Although this question should be studied further using school census data, the most plausible explanation would seem to be that many privately-run and community-run schools had become unsustainable and were shut down during this period.

[9] The Family Planning Coordinating Board (BKKBN) of Indonesia classifies all households into five welfare strata: (1) pre-prosperous households (*Keluarga Pra Sejahtera* or KPS), (2) prosperous households level I (*Keluarga Sejahtera* I or KS I), (3) KS II, (4) KS III, and (5) KS III+. Poor households are often equated to KPS households alone, or KPS and KS I households. See BKKBN (1994) for further details.

Table 1. Characteristics of and changes in roads, schools, and healthcare facilities: 1996–2000 and 2000–2006

	1996	2000	2006	1996–2000	2000–2006
			(percent)		
Roads					
Paved	57.51	55.42	58.03	–	–
Hardened	25.02	28.88	25.77	–	–
Soil	17.12	15.26	15.77	–	–
Other	0.35	0.45	0.54	–	–
Improved	–	–	–	13.73	19.57
No change	–	–	–	74.07	68.66
Deteriorated	–	–	–	12.2	11.77
Schools					
Primary schools (yes-1)	92.42	73.98	91.3		
Improved				0.59	18.28
No change				83.95	80.76
Deteriorated				15.47	0.96
Junior high school (yes-1)	41.46	24.93	44.42		
Improved				2.87	21.64
No change				78.93	76.22
Deteriorated				18.2	2.14
Health facilities					
Puskesmas (yes-1)	4.3	5.6	12.1		
Improved				2.34	7.66
No change				95.98	89.98
Deteriorated				1.68	2.36
Polyclinic (yes-1)	10.9	11.6	10.7		
Improved				3.13	2.33
No change				95.08	95.91
Deteriorated				1.79	1.76

The second explanatory variable of interest is local preference. Here, we consider characteristics such as the village head's gender, age, education, and tenure, and the gender composition of the voters. Notably, although the total number of female village heads in the PODES dataset is relatively large (due to the large sample size), the proportion of villages with female heads is actually very small.

Table 2 provides summary statistics for all variables utilized in the estimation.

Table 2. Summary statistics

		1996–2000		2000–2006	
Variable name	**Variable description**	**Mean**	**Standard deviation**	**Mean**	**Standard deviation**
Road_Change	Change in village road between (*t*–1) and *t* periods. Three possible states are deterioration 1, no change 2, and improvement 3	2.014	0.509	2.067	0.562
Road_hard	If type of village road was hardened in (*t*-1) period equals 1, else 0	0.250	0.433	0.289	0.453
Road_paved	If type of village road was paved in (*t*-1) period equals 1, else 0	0.575	0.494	0.554	0.497
Primary school change	Change in primary school between (*t*-1) and *t* periods. Three possible states are deterioration 1, no change 2, and improvement 3	1.851	0.372	2.173	0.403
Primary school (*t*-1)	If village had primary school in (*t*-1) period equals 1, else 0	0.924	0.265	0.740	0.439
Mean distance primary (*t*-1)	Average distance of primary schools in district (in km) in (*t*-1) period	0.449	9.849	1.280	32.540
Junior high school change	Change in junior high school between (*t*-1) and *t* periods. Three possible states are deterioration 1, no change 2, and improvement 3	1.847	0.433	2.195	0.447
Junior high school (*t*-1)	If village had junior high school in (*t*-1) period equals 1, else 0	0.415	0.493	0.249	0.433
Mean distance junior (*t*-1)	Average distance of junior high school in district (in km) in (*t*-1) period	7.084	33.122	7.930	36.570
Polyclinic_Change	Change in polyclinic between (*t*–1) and *t* periods. Three possible states are deterioration 1, no change 2, and improvement 3	2.013	0.221	2.053	0.312
Polyclinic (*t*-1)	If village had a polyclinic in (*t*-1) equals 1, else 0	0.042	0.200	0.055	0.227
*Puskesma*_Change	Change in *puskesma* between (*t*–1) and *t* periods. Three possible states are deterioration 1, no change 2, and improvement 3	2.007	0.201	2.006	0.202
Puskesma (*t*-1)	If village had a *puskesma* in (*t*-1) equals 1, else 0	0.106	0.308	0.111	0.314
Income (*t*-1)	The availability of local resource at village level in the (*t*-1) period. If village had 50 percent or more families in welfare equals 1, else 0	0.606	0.489	0.495	0.500
GRDP	Annual growth in real gross regional domestic product	-1.873	18.934	14.537	6.527
Head's gender	Gender of village head (male 1, female 0)	0.980	0.139	0.977	0.149
Age of village head	Age of village head in years	44.655	8.683	44.424	8.926
Education of village head	Not completed 1, else 0	0.026	0.160	0.040	0.197
Education of village head	Primary school 1, else 0	0.259	0.438	0.171	0.377
Education of village head	Junior high school 1, else 0	0.276	0.447	0.281	0.449
Education of village head	High school 1, else 0	0.350	0.477	0.392	0.488
Education of village head	Academy 1, else 0	0.039	0.193	0.035	0.184
Education of village head	University 1, else 0	0.046	0.210	0.075	0.264
Duration of village head	Duration of village head in years	5.692	5.054	4.637	5.113
Percent of women voters	Percent of women voters in village among total voters	49.067	8.869	50.169	4.453
Population (*t*-1)	The size of village population in (*t*-1) period	2,985.000	8,574.000	2,871.000	3,762.000
Station_Port (*t*-1)	If the village had any station/terminal/airport/ seaport in period (*t*-1) periods equals 1, else 0	0.057	0.231	0.068	0.252
Disaster (*t*-1)	Any disaster in the last three years: yes 1, no 2	0.534	0.499	0.394	0.489
Topography	Village topography	0.715	0.451	0.715	0.451

5. EMPIRICAL RESULTS

Local Income and Changes in Local Public Goods

Tables 3, 4a, 4b, 5a, and 5b show the estimation results we obtain when we regress the change in local public goods (roads, schools, and health facilities) on local income (rich or poor) while controlling for the other factors described in equation (1), including the initial stock of public goods. The estimated coefficients are derived from ordered probits generated without and with district-fixed effects (FE). Results are shown for both the pre-decentralization (1996–2000) and post-decentralization (2000–2006) periods. To ensure comparability between these two periods, the parameters for the latter are adjusted to reflect an equal length of time (four years).

As can be seen in the tables, the results show a significant dependency of roads, public schools,[10] and healthcare facilities on local income and resources, in both the pre- and post-decentralization periods. This indicates that, compared to a rich village, a village with more poor households is less likely to see improvement of its existing public infrastructures or provision of new public infrastructures. Note that the reverse causality of public infrastructures to income is controlled for in this estimation. It is therefore the local income, in addition to other factors, that determines local public goods here.

Local government jurisdictions in Indonesia are not financially self-sufficient, and their revenue-raising capabilities can vary widely, depending on local economic activities and resources. Although unified fiscal transfers are provided from the central government, inequality persists among local jurisdictions, and revenue shortfalls (relative to expenditure responsibilities) often mean that poor jurisdictions have fewer public goods. This is true for all three types of public goods discussed herein. Of interest, however, although one might expect that local public goods would not depend on local income in the pre-decentralization period, our empirical findings show otherwise.

How has the decentralization changed this dependency? A comparison of the estimated coefficients (marginal effects) of local income between the pre- and in-decentralization periods shows that, contrary to our expectations, the dependency of local public infrastructures on local income declined substantially following decentralization.[11] This finding remains equally valid across the examined public goods and across estimation methods. Although the addition of district-fixed effects reduces the size of the income coefficient, it does not change the pre- and post-decentralization period differences.

This finding is counterintuitive and goes against our initial expectations in suggesting that decentralization has actually eased local resource constraints. There are several plausible explanations for this finding. For example, competition among local government jurisdictions may have enhanced their efficiencies (Tiebout 1956). Alternatively, local benefits may be linked to local costs, allowing local governments to tailor public goods and services to local circumstances (Musgrave 1959). There may be increased accountability among bureaucrats who report directly to the locally elected representative rather than the central government (Bardhan and Mookherjee 2006). Finally, decentralization might have changed the priority among competing, locally financed public goods, with the result that the voters may have prioritized the local public goods considered herein over alternative uses of their local resources. This issue of priority/preference is discussed further in the next section.

It seems that decentralization actually improved the availability of local public goods in poor communities. While the differences in local public goods between rich and poor localities were largely maintained, it did not seem to depend heavily on local income, even though this dependency was initially thought to be the main impediment against convergence in the decentralized regime. Horizontal inequalities among local jurisdictions are not uncommon in other countries, and experience has shown that vertical transfers may not be sufficient to ensure equality. However, local jurisdictions have the benefit of being able to provide public goods according to local needs and fiscal/financial capabilities. The Indonesian experience appears to indicate these.

[10] Primary schools are the exception; this parameter shows a positive relationship, indicating that poor villages financed more primary schools during the decentralized period.

[11] Healthcare facilities are the exception.

Table 3. Local income and changes in local public goods: Village roads

Dependent variable: change in village road: deterioration 1, no change 2, improvement 3

Estimation method: ordered probit

	1996–2000						2000–2006					
	(1)		(2)		(3)		(1)		(2)		(3)	
	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects
Villages with 50% or more families in pre-welfare and welfare 1 in (*t*-1) period: yes 1, no 0	-0.2400 (0.0310)***	-0.0352 (0.0046)***	-0.1949 (0.0212)***	-0.0258 (0.0030)***	-0.2390 (0.0320)***	-0.0349 (0.0048)***	-0.0845 (0.0211)***	-0.0184 (0.0046)***	-0.0950 (0.0170)***	-0.0187 (0.0033)***	-0.0934 (0.0260)***	-0.0297 (0.0083)***
Road_hardened in (*t*-1) period equals 1, else 0	-0.8000 (0.0560)***	-0.0872 (0.0050)***	-0.8878 (0.0555)***	-0.0851 (0.0055)***	-0.8160 (0.0590)***	-0.0894 (0.0053)***	-0.3769 (0.0416)***	-0.0721 (0.0073)***	-0.6331 (0.0359)***	-0.1000 (0.0061)***	-0.4442 (0.0494)***	-0.1224 (0.0125)***
Road_paved in (*t*-1) period equals 1, else 0	-2.0070 (0.0640)***	-0.4030 (0.0158)***	-2.328 (0.0676)***	-0.4598 (0.0140)***	-2.0180 (0.0670)***	-0.4031 (0.0166)***	-1.2375 (0.0416)***	-0.3009 (0.0120)***	-1.6632 (0.0471)***	-0.3850 (0.0088)***	-1.4094 (0.0527)***	-0.5132 (0.0211)***
Population of village in (*t*-1) period X 10^4	0.0388 (0.0140)***	0.0055 (0.0000)**	0.0234 (0.0120)***	0.0030 (0.0000)**	0.0416 (0.0150)*	0.0059 (0.0000)*	0.2158 (0.0271)***	0.0471 (0.0000)***	0.1000 (0.0193)***	0.0197 (0.0000)***	0.2181 (0.0307)***	0.0692 (0.0000)***
If the village had any terminal/ station/port in (*t*-1) period: yes 1, no 0	0.1760 (0.0290)***	0.0279 (0.0052)***	0.2059 (0.0298)***	0.0304 (0.0051)***	0.1860 (0.0290)***	0.0297 (0.0052)***	0.0805 (0.0205)***	0.0186 (0.0049)***	0.1379 (0.0173)***	0.0302 (0.0044)***	0.1074 (0.0207)***	0.0369 (0.0076)***
Village topography (hill area 0, flatland 1)	0.1410 (0.0310)***	0.0192 (0.0040)***	0.1702 (0.0298)***	0.0208 (0.0035)***	0.1360 (0.0320)***	0.0185 (0.0041)***	0.1247 (0.0231)***	0.0260 (0.0046)***	0.1375 (0.0188)***	0.0256 (0.0035)***	0.1174 (0.0280)***	0.0356 (0.0079)***
Any disaster in last three years: yes 1, no 2	-0.0472 (0.0310)	-0.0067 (0.0044)	-0.1026 (0.0303)***	-0.0131 (0.0038)***	-0.0567 (0.0320)***	-0.0080 (0.0046)***	-0.0597 (0.0185)***	-0.0129 (0.0040)***	-0.0231 (0.0167)	-0.0045 (0.0032)	-0.0787 (0.0247)***	-0.0246 (0.0052)***
Annual GRDP growth					-0.0342 (0.0660)	-0.0049 (0.0094)					-0.0045 (0.0045)	-0.0014 (0.0014)
Fixed effects included	No		Yes		No		No		Yes		No	
Observations	49,168		49,168		49,168		51,995		51,995		51,995	

Notes: Robust standard errors in parentheses. * Significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent. District-specific constants are not reported in the table. GRDP: gross regional domestic product.

Table 4a. Local income and changes in local public goods: Primary schools

Dependent variable: change in the availability of primary schools in village

Estimation method: ordered probit

	1996–2000						2000–2006					
	(1)		(2)		(3)		(1)		(2)		(3)	
	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects
Villages with 50% or more families in pre-welfare and welfare 1 in (*t*-1) period: yes 1, no 0	-0.0296	-0.0008	-0.0485	-0.0015	-0.0111	-0.0003	0.0999	0.0036	0.0335	0.00245	0.0884	0.0021
	(0.0420)	(0.0011)	(0.0400)	(0.0011)	(0.0418)	(0.0011)	(0.0273)***	(0.0011)***	(0.0247)	(0.0011)	(0.0328)***	(0.0010)**
If the village had a primary school in (*t*-1) period: yes 1, no 0	3.4220	0.7934	3.1620	0.7742	3.4410	0.7933	1.8282	0.4063	1.6525	0.39427	1.8680	0.3783
	(0.0770)***	(0.0303)***	(0.0780)***	(0.0322)***	(0.0844)***	(0.0338)***	(0.0420)***	(0.0218)***	(0.0440)***	(0.0240)	(0.0570)***	(0.0306)***
Mean distance in district in (*t*-1) period X initial condition X 100	0.5290	0.0139	0.5960	0.0086	0.5430	0.0139	-0.0022	-0.0001	0.0205	0.0010	0.0137	0.0003
	(0.1900)***	(0.0060)**	(0.2100)**	(0.0050)*	(0.1880)***	(0.0050)***	(0.0087)	(0.0001)	(0.0100)**	(0.0007)	(0.0054)**	(0.0001)***
Population of village in (*t*-1) period X 10^4	1.9000	0.0500	1.4000	0.0490	1.9000	0.0484	1.8515	0.0661	1.2065	0.06610	2.1641	0.0521
	(0.4200)***	(0.0001)***	(0.3700)***	(0.0001)***	(0.4500)***	(0.0001)***	(0.2464)***	(0.0001)***	(0.1667)***	(0.0001)	(0.2881)***	(0.0001)***
If the village had any terminal/ station/port in (*t*-1) period: yes 1, no 0	-0.0523	-0.0015	-0.1220	-0.0035	-0.1400	-0.0041	-0.0230	-0.0009	-0.0623	-0.00355	-0.0553	-0.0015
	(0.0940)	(0.0027)	(0.0950)	(0.0030)	(0.0920)	(0.0030)	(0.0493)	(0.0019)	(0.0507)	(0.0024)	(0.0737)	(0.0022)
Village topography (hill area 0, flatland 1)	-0.0935	-0.0023	-0.0467	-0.0019	-0.1110	-0.0027	-0.0522	-0.0018	0.0023	-0.00001	-0.0744	-0.0017
	(0.0570)*	(0.0014)*	(0.0460)	(0.0013)	(0.0574)*	(0.0014)*	(0.0366)	(0.0012)	(0.0267)	(0.0011)	(0.0389)*	(0.0009)*
Any disaster in last three years: yes 1, no 2	0.0211	0.0006	-0.0666	-0.0001	0.0066	0.0002	-0.0986	-0.0037	-0.0319	-0.00236	-0.1561	-0.0040
	(0.0540)	(0.0014)	(0.0520)	(0.0013)	(0.0531)	(0.0013)	(0.0446)**	(0.0019)*	(0.0180)*	(0.0014)	(0.0523)***	(0.0018)**
Annual GRDP growth x 100					0.6890	0.0176					-0.2968	-0.0071
					(0.2240)***	(0.0070)***					(0.2613)	(0.0067)
Fixed effects included	No		Yes		No		No		Yes		No	
Observations	52,127		52,127		52,127		55,129		55,129		55,129	

Notes: Robust standard errors in parentheses. * Significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent. District-specific constants are not reported in the table. GRDP: gross regional domestic product.

Table 4b. Local income and changes in local public goods: Junior high schools

Dependent variable: change in the availability of junior high schools in village

Estimation method: ordered probit

	1996–2000						2000–2006					
	(1)		(2)		(3)		(1)		(2)		(3)	
	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects
Villages with 50% or more families in pre-welfare and welfare 1 in (*t*-1) period: yes 1, no 0	-0.1190	-0.0390	-0.1103	-0.0355	-0.1150	-0.0379	0.0007	0.0003	-0.0019	-0.0007	0.0005	0.0002
	(0.0250)***	(0.0082)***	(0.0006)***	(0.0070)***	(0.0260)***	(0.0086)***	(0.0132)	(0.0046)	(0.0129)	(0.0045)	(0.0153)	(0.0055)
If the village had a junior high school in (*t*-1) period: yes 1, no 0	2.8670	0.8462	10.7398	0.8430	2.8700	0.8468	1.6236	0.5173	1.6222	0.5170	1.6435	0.5213
	(0.0310)***	(0.0045)***	(0.0066)***	(0.0049)***	(0.0070)***	(0.0070)***	(0.0221)***	(0.0042)***	(0.0221)***	(0.0042)***	(0.0260)***	(0.0048)***
Mean distance in district in (*t*-1) period X initial condition X 100	-0.0015	-0.0005	-0.0055	-0.0018	-0.0019	-0.0006	-0.0013	-0.0005	-0.0037	-0.0013	0.0036	0.0013
	(0.0034)	(0.0001)	(0.0041)	(0.0010)	(0.0036)	(0.0010)	(0.0023)	(0.0007)	(0.0023)	(0.0007)	(0.0041)	(0.0013)
Population of village in (*t*-1) period X 10^4	0.0615	0.0200	0.0362	0.0115	0.0597	0.0195	0.5509	0.1928	0.5629	0.1968	0.5523	0.1994
	(0.0270)**	(0.0001)**	(0.0160)**	(0.0001)**	(0.0260)***	(0.0001)***	(0.0513)***	(0.0001)***	(0.0516)***	(0.0001)***	(0.0574)***	(0.0001)***
If the village had any terminal/ station/port in (*t*-1) period: yes 1, no 0	0.2000	0.0682	0.1897	0.0637	0.1930	0.0662	0.1261	0.0458	0.1123	0.0406	0.1061	0.0392
	(0.0380)***	(0.0134)***	(0.0019)***	(0.0129)***	(0.0390)***	(0.0139)***	(0.0234)***	(0.0088)***	(0.0242)***	(0.0091)***	(0.0273)***	(0.0104)***
Village topography (hill area 0, flatland 1)	-0.0033	-0.0011	-0.0023	-0.0007	-0.0109	-0.0036	-0.0011	-0.0004	0.0075	0.0026	-0.0107	-0.0039
	(0.0270)	(0.0088)	(0.0011)	(0.0077)	(0.0280)	(0.0092)	(0.0173)	(0.0061)	(0.0169)	(0.0059)	(0.0207)	(0.0074)
Any disaster in last three years: yes 1, no 2	-0.0596	-0.0193	-0.0067	-0.0021	-0.0691	-0.0225	0.0195	0.0068	0.0211	0.0074	0.0073	0.0026
	(0.0240)**	(0.0079)**	(0.0008)	(0.0075)	(0.0250)***	(0.0082)**	(0.0145)	(0.0051)	(0.0134)**	(0.0047)**	(0.0173)***	(0.0062)***
Annual GRDP growth					0.1590	0.0518					-0.1254	-0.0453
					(0.0500)***	(0.0160)**					(0.2134)	(0.0767)
Fixed effects included	No		Yes		No		No		Yes		No	
Observations	52,127		52,127		48,335		55,129		55,129		55,129	

Notes: Robust standard errors in parentheses. * Significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent. District-specific constants are not reported in the table. GRDP: gross regional domestic product.

Table 5a. Local income and changes in local public goods: Healthcare infrastructure (polyclinic)

Dependent variable: change in the availability of polyclinic in village

Estimation method: ordered probit

	1996–2000						2000–2006					
	(1)		(2)		(3)		(1)		(2)		(3)	
	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects
Villages with 50% or more families in pre-welfare and welfare 1 in (*t*-1) period: yes 1, no 0	-0.3790 (0.0120)***	-0.0127 (0.0006)***	-0.3411 (0.0011)***	-0.0011 (0.0001)***	-0.3770 (0.0120)***	-0.0127 (0.0006)***	-0.1107 (0.0273)***	-0.0062 (0.0017)***	-0.1335 (0.0005)***	-0.0018 (0.0001)***	-0.1313 (0.0288)***	-0.0069 (0.0018)***
If the village had a polyclinic in (*t*-1) period: yes 1, no 0	-7.6650 (0.0250)***	-0.0267 (0.0023)***	-13.8308 (0.0151)***	-0.0056 (0.0002)***	-7.6410 (0.0250)***	-0.0272 (0.0024)***	-6.6767 (0.4669)***	-0.0497 (0.0033)***	-9.3162 (0.0093)***	-0.0213 (0.0003)***	-7.4504 (0.5025)***	-0.0568 (0.0041)***
If the village had a *puskesmas* in (*t*-1) period: yes 1, no 0	0.6140 (0.0140)***	0.0327 (0.0035)***	0.6132 (0.0022)***	0.0040 (0.0001)***	0.6100 (0.0140)***	0.0326 (0.0036)***	0.1734 (0.0227)***	0.0177 (0.0031)***	0.2372 (0.0022)***	0.0046 (0.0001)***	0.1896 (0.0248)***	0.0124 (0.0023)***
Population of village in (*t*-1) period X 10^4	0.0778 (0.0023)***	0.0024 (0.0000)***	0.0478 (0.0004)***	0.0002 (0.0001)***	0.0757 (0.0023)***	0.0023 (0.0000)***	0.6670 (0.0600)***	0.0371 (0.0000)***	0.4562 (0.0017)***	0.0061 (0.0001)***	0.6184 (0.0670)***	0.0326 (0.0001)***
If the village had any terminal/ station/port in (*t*-1) period: yes 1, no 0	0.3870 (0.0130)***	0.0173 (0.0022)***	0.4112 (0.0027)***	0.0021 (0.0001)***	0.3840 (0.0140)***	0.0172 (0.0022)***	0.1087 (0.0300)***	0.0070 (0.0024)***	0.1866 (0.0023)***	0.0034 (0.0001)***	0.0958 (0.0288)***	0.0057 (0.0021)***
Village topography (hill area 0, flatland 1)	0.1720 (0.0130)***	0.0048 (0.0008)***	0.1801 (0.0016)***	0.0005 (0.0001)***	0.1830 (0.0140)***	0.0051 (0.0008)***	0.0612 (0.0334)*	0.0033 (0.0018)***	0.1209 (0.0011)***	0.0015 (0.0001)***	0.1072 (0.0322)***	0.0052 (0.0016)***
Any disaster in last three years: yes 1, no 2	-0.0553 (0.0130)***	-0.0017 (0.0002)***	-0.0400 (0.0011)***	-0.0001 (0.0001)***	-0.0500 (0.0130)***	-0.0015 (0.0003)***	-0.0184 (0.0200)	-0.0010 (0.0011)	-0.0049 (0.0009)***	-0.0001 (0.0001)***	-0.0056 (0.0221)	-0.0003 (0.0012)
Annual GRDP growth x 100					0.0582 (0.0014)***	0.0018 (0.0000)***					0.6553 (0.5293)	0.0345 (0.0288)
Fixed effects included	No		Yes		No		No		Yes		No	
Observations	52,127		52,127		52,127		55,129		55,129		55,129	

Notes: Robust standard errors in parentheses. * Significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent. District-specific constants are not reported in the table. GRDP: gross regional domestic product.

Table 5b. Local income and changes in local public goods: Healthcare infrastructure (*puskesmas*)

Dependent variable: change in the availability of *puskesmas* in village

Estimation method: ordered probit

	1996–2000						2000–2006					
	(1)		(2)		(3)		(1)		(2)		(3)	
	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects
Villages with 50% or more families in pre-welfare and welfare 1 in (*t*-1) period: yes 1, no 0	-0.1200 (0.0063)***	-0.0015 (0.0001)***	-0.1427 (0.0008)***	-0.0003 (0.0001)***	-0.1160 (0.0067)***	-0.0014 (0.0001)***	-0.0504 (0.0048)***	-0.0006 (0.0001)**	-0.0404 (0.0162)**	-0.0006 (0.0001)**	-0.0398 (0.0059)***	-0.0004 (0.0001)***
If the village had a *puskesmas* in (*t*-1) period: yes 1, no 0	-6.2740 (0.0170)***	-0.0258 (0.0011)***	-11.0575 (0.0123)***	-0.0232 (0.0003)***	-6.2750 (0.0170)***	-0.0255 (0.0012)***	-4.2555 (0.0107)***	-0.0174 (0.0010)***	-8.6149 (0.0322)***	-0.0173 (0.0013)***	-4.3262 (0.0140)***	-0.0160 (0.0016)***
If the village had a polyclinic in (*t*-1) period: yes 1, no 0	0.3600 (0.0073)***	0.0067 (0.0005)***	0.2865 (0.0031)***	0.0010 (0.0002)***	0.3820 (0.0076)***	0.0072 (0.0006)***	0.0907 (0.0067)***	0.0012 (0.0002)***	0.0946 (0.0042)***	0.0012 (0.0002)***	0.0834 (0.0080)***	0.0009 (0.0002)***
Population of village in (*t*-1) period X 10^4	0.0426 (0.0012)***	0.0005 (0.0001)***	0.0342 (0.0004)***	0.0007 (0.0001)***	0.0411 (0.0012)***	0.0005 (0.0001)***	0.2368 (0.0080)***	0.0026 (0.0001)***	0.2165 (0.0020)***	0.0027 (0.0002)***	0.2715 (0.0093)***	0.0024 (0.0001)***
If the village had any terminal/station/ port in (*t*-1) period: yes 1, no 0	0.3630 (0.0068)***	0.0067 (0.0005)***	0.3638 (0.0024)***	0.0014 (0.0000)***	0.3710 (0.0070)***	0.0068 (0.0005)***	0.1881 (0.0061)***	0.0029 (0.0003)**	0.1618 (0.0162)***	0.0026 (0.0003)***	0.1607 (0.0080)***	0.0019 (0.0003)***
Village topography (hill area 0, flatland 1)	0.0371 (0.0073)***	0.0004 (0.0001)***	0.0525 (0.0014)***	0.0001 (0.0000)***	0.0347 (0.0077)***	0.0004 (0.0001)***	0.0167 (0.0060)***	0.0002 (0.0001)**	0.0581 (0.0242)**	0.0003 (0.0001)**	0.0282 (0.0073)***	0.0002 (0.0001)***
Any disaster in last three years: yes 1, no 2	0.0178 (0.0067)***	0.0002 (0.0001)**	0.0191 (0.0009)***	0.0004 (0.0000)**	0.0125 (0.0069)*	0.0001 (0.0001)	0.0279 (0.0051)***	0.0003 (0.0001)***	-0.0137 (0.0170)	0.0003 (0.0001)***	0.0323 (0.0063)***	0.0003 (0.0001)***
Annual GRDP growth x 100					-0.0033 (0.0014)**	-0.00038 (0.0001)***					-0.0018 (0.0005)***	-0.0016 (0.0001)***
Fixed effects included			Yes		No				Yes		No	
Observations	52,127		52,127		52,127		55,129		55,129		55,129	

Notes: Robust standard errors in parentheses. * Significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent. District-specific constants are not reported in the table. GRDP: gross regional domestic product.

Local Preference and Changes in Local Public Goods

Different groups within a local jurisdiction may have different preferences when choosing among alternative public goods, and the possibility of rank-ordering these alternatives may enable them to choose one public good over another. Tables 6, 7a, 7b, 8a, and 8b present the estimation results for the impact of local preference on the changes in local public goods between two time points. We regress the changes on a set of preference indicators while controlling for the other factors described in equation (2), such as the initial stock of public goods and the local income. The estimated coefficients are derived from ordered probits without and with district-fixed effects (FE). Results are shown for both the pre-decentralization (1996–2000) and post-decentralization (2000–2006) periods.

The two explanatory variables that are of most interest for the preference proxies are the gender of the *desa* head and the gender composition of the voters. For the local road, the presence of a female *desa* head has a positive effect on local road provision. Although the male/female voter composition does not significantly have an impact on the road provision during the pre-decentralization period, it is significant for the post-decentralization period. This suggests that roads ranked very high on the preference lists of women voters, and this preference was reflected in the allocation of public goods under the decentralized regime. This finding is similar to the results of other studies on the benefits of rural roads for all households, poorer households, and female-headed households (Jacoby 2000; Gibson and Rozelle 2003). Our finding of a gender-differentiated preference in public goods allocation is similar to that found in Chattopadhyay and Duflo (2004).

In the case of educational infrastructure, the presence of a female *desa* head has a positive impact on the provision of junior high schools. However, this effect becomes insignificant if we control for district-fixed effects. Similarly, the number of years of schooling of the *desa* head has a positive impact on school provision, but this finding becomes insignificant if we control for district-fixed effects. Notably, Indonesia has a diverse educational system in which general education, technical education, religious education, and public and private education institutions all co-exist. Therefore the local-level allocation of public funds to education could be much more complex than reflected herein.

In the case of healthcare infrastructure, the impact of gender-differentiated preference indicators is either mixed or insignificant during the post-decentralization period. There are at least two plausible explanations for this. First, as compared to roads, healthcare (and educational) infrastructures are more complex to build and require resources beyond the physical structures, such as doctors and nurses (teachers). The recruitment and retention of such resources require policies and plans that are not considered herein. Second, due to spillovers, there may be free-riding and coordination problems that extend beyond local resources and preferences. While the externalities for local roads are easy to capture within a locality, those for healthcare (and education) infrastructures are not as easy to exclude.[12]

We further see that the tenures of elected local government officials are negatively related to the provision of local public infrastructures. One plausible explanation for this finding is that because elected representatives in Indonesia have a short time horizon, they may ignore long-term prospects in favor of more immediate payoffs. If the prospect of reelection diminishes with duration in office, the goal of public officials might systematically diverge from the maximization of citizen welfare, especially in their second terms (Brennan and Buchanan 1980). Since the decentralization of Indonesia, there has been some experimentation within the local government selection process. This may have created a certain degree of uncertainty in the minds of elected officials.

[12] Of course, mechanisms (for example, discriminatory pricing) can be designed for the out-of-community beneficiaries.

Table 6. Local preference and changes in local public goods: Village roads

Dependent variable: change in village road: deterioration 1, no change 2, improvement 3

Estimation method: ordered probit

	1996–2000						2000–2006					
	(1)		(2)		(3)		(1)		(2)		(3)	
	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects
Village head's gender in (*t*-1) period (male 1, female 0)	0.0121 (0.0430)	0.0017 (0.0058)	-0.006 (0.0414)	-0.0008 (0.0053)	0.0100 (0.0440)	0.0014 (0.0060)	-0.0559 (0.0268)**	-0.0124 (0.0062)**	-0.0228 (0.0260)	-0.0045 (0.0052)	-0.0632 (0.0293)***	-0.0140 (0.0068)***
Percent of women voters in village X 10^2	0.0323 (0.0010)	0.0045 (0.0140)	0.0400 (0.0014)	0.0049 (0.0180)	0.0083 (0.0980)	0.00115 (0.0140)	0.8911 (0.2345)***	0.1905 (0.0500)***	0.6937 (0.2068)***	0.1346 (0.0394)***	0.5776 (0.2801)**	0.1212 (0.0594)**
Village head's age in (*t*-1) period	0.0061 (0.0012)***	0.0008 (0.0002)***	0.0045 (0.0010)***	0.0006 (0.0001)***	0.0065 (0.0012)***	0.0009 (0.0002)***	0.0044 (0.0009)***	0.0009 (0.0002)***	0.0036 (0.0005)***	0.0007 (0.0001)***	0.0036 (0.0009)***	0.0008 (0.0002)***
Village head's education in *t*-1 period												
Not completed	0.0114 (0.1700)	0.0016 (0.0236)	-0.1104 (0.1592)	-0.0129 (0.0170)	0.0841 (0.1700)	0.0124 (0.0270)	0.0464 (0.0871)	0.0102 (0.0200)	-0.0532 (0.0867)	-0.0098 (0.0156)	0.0576 (0.0867)	0.0127 (0.0197)
Primary school	0.2440 (0.1600)*	0.0375 (0.0269)	0.0664 (0.1425)	0.0086 (0.0191)	0.3130 (0.1700)*	0.0495 (0.0295)*	0.0291 (0.0938)	0.0063 (0.0202)	-0.0980 (0.0934)	-0.0179 (0.0160)	0.0526 (0.0934)	0.0114 (0.0209)
Junior high school	0.2820 (0.1600)*	0.0432 (0.0271)*	0.1425 (0.1457)	0.0189 (0.0204)	0.3590 (0.1700)**	0.0563 (0.0296)**	0.0951 (0.0938)	0.0210 (0.0213)	-0.0507 (0.0934)	-0.0096 (0.0172)	0.1081 (0.0934)	0.0237 (0.0212)
High school	0.3620 (0.1600)**	0.0538 (0.0258)**	0.223 (0.1458)	0.0293 (0.0201)	0.4430 (0.1700)***	0.0667 (0.0275)**	0.1990 (0.0938)***	0.0437 (0.0211)**	0.0296 (0.0934)	0.0058 (0.0181)	0.2181 (0.0934)***	0.0471 (0.0205)***
Academy	0.5130 (0.1600)***	0.0982 (0.0400)***	0.3441 (0.1475)**	0.0547 (0.0288)**	0.5850 (0.1700)***	0.1164 (0.0444)***	0.2533 (0.0938)***	0.0645 (0.0283)**	0.0680 (0.0934)	0.0139 (0.0206)	0.2735 (0.0934)***	0.0697 (0.0284)***
University	0.4040 (0.1600)**	0.0722 (0.0357)	0.235 (0.1468)	0.0347 (0.0251)	0.4920 (0.1700)***	0.0924 (0.0403)**	0.2539 (0.0938)***	0.0637 (0.0273)***	0.0612 (0.0934)	0.0124 (0.0197)	0.2681 (0.0934)***	0.0668 (0.0268)***
Village head's duration in years	-0.0053 (0.0017)***	-0.0007 (0.0002)***	-0.0007 (0.0016)	-0.0001 (0.0002)	-0.0052 (0.0017)***	-0.0007 (0.0002)**	-0.0069 (0.0013)***	-0.0015 (0.0003)***	-0.0007 (0.0010)	-0.0001 (0.0002)	-0.0077 (0.0016)***	-0.0016 (0.0003)***
Villages with 50% or more families in pre-welfare and welfare 1 in (*t*-1) period: yes 1, no 0	-0.2060 (0.0310)***	-0.0293 (0.0044)***	-0.1795 (0.0217)**	-0.0231 (0.0029)***	-0.2020 (0.0320)***	-0.0287 (0.0046)***	-0.0757 (0.0208)***	-0.0161 (0.0044)***	-0.0874 (0.0167)***	-0.0168 (0.0032)***	-0.0834 (0.0253)***	-0.0175 (0.0053)***
Road hardened in (*t*-1) period equals 1, else 0	-0.7940 (0.0560)***	-0.0833 (0.0048)***	-0.8829 (0.0569)***	-0.0811 (0.0053)***	-0.8130 (0.0590)***	-0.0855 (0.0051)***	-0.4094 (0.0402)***	-0.0758 (0.0067)***	-0.6403 (0.0360)***	-0.0989 (0.0060)***	-0.4622 (0.0480)***	-0.0837 (0.0080)***
Road_paved in (*t*-1) period equals 1, else 0	-2.0510 (0.0660)***	-0.4187 (0.0165)***	-2.3611 (0.0695)***	-0.4743 (0.0146)***	-2.0660 (0.0690)***	-0.4200 (0.0175)***	-1.3018 (0.0395)***	-0.3103 (0.0112)***	-1.6828 (0.0467)***	-0.3827 (0.0087)***	-1.4461 (0.0507)***	-0.3497 (0.0135)***
Population of village in (*t*-1) period X 10^4	0.0287 (0.0110)**	0.0521 (0.0001)**	0.0208 (0.0110)*	0.0026 (0.0001)**	0.0312 (0.0130)**	0.0043 (0.0001)*	0.1789 (0.0255)***	0.0382 (0.0001)***	0.0840 (0.0187)***	0.0162 (0.0001)***	0.1828 (0.0280)***	0.0384 (0.0001)***
If the village had any terminal/station/ port in (*t*-1) period: yes 1, no 0	0.1560 (0.0280)***	0.0240 (0.0048)***	0.195 (0.0295)***	0.0280 (0.0049)**	0.1670 (0.0290)***	0.0258 (0.0049)***	0.0771 (0.0201)***	0.0173 (0.0047)***	0.1307 (0.0173)***	0.0280 (0.0043)***	0.0994 (0.0200)***	0.0225 (0.0048)***
Village topography (hill area 0, flatland 1)	0.1400 (0.0310)***	0.0187 (0.0040)***	0.1543 (0.0302)***	0.0185 (0.0034)**	0.1350 (0.0320)***	0.0179 (0.0041)***	0.1139 (0.0228)***	0.0233 (0.0044)***	0.1294 (0.0187)***	0.0237 (0.0035)***	0.1041 (0.0273)***	0.0210 (0.0052)***
Any disaster in last three years: yes 1, no 2	-0.0474 (0.0310)	-0.0066 (0.0043)	-0.1088 (0.0305)***	-0.0136 (0.0038)	-0.0564 (0.0320)*	-0.0078 (0.0044)***	-0.0567 (0.0188)***	-0.0120 (0.0039)***	-0.0223 (0.0167)	-0.0043 (0.0032)	-0.0727 (0.0240)***	-0.0150 (0.0049)***
Annual GRDP growth X 100					-0.0637 (0.0770)	-0.0089 (0.0110)					-0.4356 (0.4135)	-0.0915 (0.0867)
Fixed effects included	No		Yes		No		No		Yes		No	
Observations	46,954		46,954		46,954		51,995		51,995		51,995	

Notes: Robust standard errors in parentheses. * Significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent. District-specific constants are not reported in the table. GRDP: gross regional domestic product.

Table 7a. Local preference and changes in local public goods: Primary schools

Dependent variable: change in the availability of primary schools in village

Estimation method: ordered probit

	1996–2000						2000–2006					
	(1)		(2)		(3)		(1)		(2)		(3)	
	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects
Village head's gender in (*t*-1) period (male 1, female 0)	0.0844	0.0017	0.0941	0.0020	0.0997	0.0020	-0.0947	-0.0029	-0.0854	-0.0026	-0.2048	-0.0035
	(0.1200)	(0.0028)	(0.1200)	(0.0029)	(0.1300)	(0.0030)	(0.0580)	(0.0015)	(0.0567)	(0.0015)*	(0.0734)***	(0.0011)**
Percent of women voters in village	-0.0061	-0.0001	-0.0057	-0.0001	-0.0055	-0.0001	0.0023	0.0001	0.0054	0.0002	0.0091	0.0002
	(0.0027)**	(0.0001)**	(0.0025)**	(0.0001)**	(0.0027)**	(0.0001)*	(0.0073)	(0.0003)	(0.0073)	(0.0003)	(0.0093)	(0.0002)
Village head's age in (*t*-1) period	0.0022	0.0001	0.0020	0.0001	0.0031	0.0001	-0.0018	-0.0001	-0.0003	-0.0001	-0.0026	-0.0001
	(0.0026)	(0.0001)	(0.0025)	(0.0001)	(0.0028)	(0.0001)	(0.0019)	(0.0001)	(0.0019)	(0.0001)	(0.0021)	(0.0001)
Village head's education in *t*-1 period												
Not completed	0.4410	0.0050	0.4600	0.0051	0.5560	0.0053	0.1114	0.0034	0.2254	0.0057	0.0894	0.0018
	(0.3000)	(0.0019)**	(0.3000)	(0.0019)**	(0.3100)*	(0.0016)***	(0.1467)	(0.0037)	(0.1467)	(0.0027)**	(0.2134)	(0.0038)
Primary school	0.4600	0.0067	0.5190	0.0073	0.5370	0.0071	0.1601	0.0048	0.2921	0.0076	0.1527	0.0030
	(0.2600)*	(0.0030)**	(0.2600)**	(0.0029)**	(0.2600)**	(0.0029)**	(0.1401)	(0.0037)	(0.1467)*	(0.0030)**	(0.2201)	(0.0037)
Junior high school	0.4790	0.0072	0.5540	0.0080	0.5530	0.0077	0.1274	0.0042	0.2908	0.0085	0.0980	0.0022
	(0.2600)*	(0.0033)**	(0.2600)**	(0.0032)**	(0.2600)**	(0.0032)**	(0.1467)	(0.0044)	(0.1467)**	(0.0039)**	(0.2201)	(0.0046)
High school	0.4930	0.0084	0.5600	0.0094	0.5710	0.0092	0.1941	0.0066	0.3575	0.0117	0.1661	0.0038
	(0.2600)*	(0.0043)*	(0.2600)**	(0.0044)**	(0.2600)**	(0.0044)**	(0.1467)	(0.0048)	(0.1467)**	(0.0050)**	(0.2201)	(0.0051)
Academy	0.3110	0.0042	0.3590	0.0045	0.4150	0.0047	0.0623	0.0020	0.2041	0.0053	0.1047	0.0021
	(0.2800)	(0.0026)*	(0.2800)	(0.0024)**	(0.2800)*	(0.0021)**	(0.1534)	(0.0045)	(0.1601)	(0.0030)*	(0.2268)	(0.0039)
University	0.3340	0.0044	0.3760	0.0047	0.4990	0.0053	0.1154	0.0035	0.2648	0.0066	0.0767	0.0016
	(0.2800)	(0.0025)	(0.2900)	(0.0024)**	(0.2800)**	(0.0018)**	(0.1534)	(0.0040)	(0.1534)*	(0.0027)**	(0.2268)	(0.0043)
Village head's duration in years	0.0059	0.0001	0.0053	0.0001	0.0054	0.0001	-0.0029	-0.0001	-0.0030	-0.0001	-0.0026	-0.0001
	(0.0039)	(0.0001)	(0.0039)	(0.0001)	(0.0040)	(0.0001)	(0.0021)	(0.0001)	(0.0019)	(0.0001)	(0.0025)	(0.0001)
Villages with 50% or more families in pre-welfare and welfare 1 in (*t*-1) period: yes 1, no 0	-0.0127	-0.0002	-0.0220	-0.0004	-0.0328	-0.0006	0.0987	0.0035	0.0700	0.0025	0.0847	0.0020
	(0.0410)	(0.0008)	(0.0440)	(0.0008)	(0.0430)	(0.0008)	(0.0253)***	(0.0011)	(0.0260)***	(0.0010)**	(0.0300)***	(0.0009)***
If the village had a primary school in (*t*-1) period: yes 1, no 0	3.3580	0.7543	3.3080	0.7382	3.3880	0.7564	1.8343	0.4073	1.8016	0.3941	1.8669	0.3786
	(0.0720)***	(0.0303)**	(0.0800)***	(0.0330)***	(0.0820)***	(0.0349)***	(0.0400)***	(0.0211)	(0.0434)***	(0.0231)***	(0.0527)***	(0.0296)***
Mean distance in district in (*t*-1) period X initial condition x 100	0.5270	0.0099	0.3810	0.0071	0.5450	0.0097	0.0009	0.0000	-0.0232	-0.0008	0.0184	0.0004
	(0.2000)***	(0.0040)**	(0.1700)**	(0.0030)**	(0.2000)**	(0.0040)**	(0.0093)	(0.0007)	(0.0113)**	(0.0007)**	(0.0080)**	(0.0001)**
Population of village in (*t*-1) period X 10^4	2.0700	0.0387	2.0700	0.0385	2.0700	0.0368	1.8142	0.0648	1.8343	0.0643	2.1277	0.0508
	(0.3900)***	(0.0000)***	(0.3700)***	(0.0000)***	(0.4200)***	(0.0000)***	(0.2401)***	(0.0000)	(0.2268)***	(0.0000)***	(0.2868)***	(0.0000)***
If the village had any terminal/station/ port in (*t*-1) period: yes 1, no 0	-0.1180	-0.0025	-0.1730	-0.0039	-0.1940	-0.0043	-0.0183	-0.0007	-0.0860	-0.0034	-0.0435	-0.0011
	(0.0940)	(0.0023)	(0.0900)*	(0.0025)	(0.0930)**	(0.0026)**	(0.0467)	(0.0000)	(0.0500)*	(0.0023)	(0.0734)	(0.0020)
Village topography (hill area 0, flatland 1)	-0.0678	-0.0012	-0.0631	-0.0011	-0.0893	-0.0015	-0.0523	-0.0018	-0.0024	-0.0001	-0.0780	-0.0018
	(0.0530)	(0.0009)	(0.0510)	(0.0009)	(0.0540)*	(0.0009)*	(0.0354)	(0.0012)	(0.0307)	(0.0011)	(0.0367)**	(0.0008)**
Any disaster in last three years: yes 1, no 2	0.0152	0.0003	0.0002	0.0000	0.0086	0.0002	-0.0967	-0.0036	-0.0631	-0.0023	-0.1481	-0.0038
	(0.0570)	(0.0011)	(0.0530)	(0.0010)	(0.0570)	(0.0010)	(0.0440)**	(0.0018)	(0.0347)*	(0.0014)*	(0.0494)***	(0.0016)**
Annual GRDP growth x 100					0.5770	0.0103					-0.2448	-0.0058
					(0.2200)***	(0.0040)***					(0.2601)	(0.0060)
Fixed effects included	No		Yes		No		No		Yes		No	
Observations	52,127		52,127		52,127		55,129		55,129		55,129	

Notes: Robust standard errors in parentheses. * Significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent. District-specific constants are not reported in the table. GRDP: gross regional domestic product.

Table 7b. Local preference and changes in local public goods: Junior high schools

Dependent variable: change in the availability of junior high schools in village

Estimation method: ordered probit

	1996–2000						2000–2006					
	(1)		(2)		(3)		(1)		(2)		(3)	
	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects
Village head's gender in (*t*-1) period (male 1, female 0)	-0.0572	-0.0193	-0.0577	-0.0194	-0.0593	-0.0201	0.0144	0.0050	0.0159	0.0055	0.0219	0.0078
	(0.0600)	(0.0204)	(0.0600)	(0.0205)	(0.0620)	(0.0213)	(0.0334)	(0.0114)	(0.0327)	(0.0114)	(0.0367)	(0.0131)
Percent of women voters in village	-0.0019	-0.0006	-0.0018	-0.0006	-0.0017	-0.0006	-0.0015	-0.0005	-0.0010	-0.0003	0.0004	0.0001
	(0.0010)*	(0.0003)*	(0.0010)*	(0.0003)*	(0.0010)*	(0.0003)*	(0.0024)	(0.0008)	(0.0023)	(0.0008)	(0.0031)	(0.0011)
Village head's age in (*t*-1) period	0.0056	0.0019	0.0057	0.0019	0.0053	0.0018	0.0026	0.0009	0.0025	0.0009	0.0015	0.0006
	(0.0013)***	(0.0004)***	(0.0013)***	(0.0004)***	(0.0014)***	(0.0005)***	(0.0007)***	(0.0003)***	(0.0007)***	(0.0003)***	(0.0009)*	(0.0003)*
Village head's education in *t*-1 period												
Not completed	-0.0527	-0.0172	-0.0566	-0.0184	-0.1040	-0.0337	0.1467	0.0536	0.1614	0.0592	0.0714	0.0262
	(0.1800)	(0.0578)	(0.1800)	(0.0577)	(0.1900)	(0.0591)	(0.0934)	(0.0355)	(0.0934)*	(0.0357)*	(0.1134)	(0.0438)
Primary school	0.0848	0.0285	0.0789	0.0265	0.0534	0.0180	0.1467	0.0531	0.1641	0.0595	0.0874	0.0320
	(0.1700)	(0.0594)	(0.1700)	(0.0590)	(0.1800)	(0.0611)	(0.0934)	(0.0343)	(0.0934)*	(0.0345)*	(0.1134)	(0.0430)
Junior high school	0.2040	0.0693	0.1970	0.0671	0.1580	0.0540	0.1634	0.0585	0.1828	0.0655	0.1087	0.0398
	(0.1800)	(0.0619)	(0.1800)	(0.0616)	(0.1800)	(0.0634)	(0.0934)*	(0.0336)*	(0.0934)**	(0.0337)*	(0.1134)	(0.0426)
High school	0.2180	0.0732	0.2120	0.0714	0.1720	0.0581	0.1874	0.0663	0.2028	0.0717	0.1081	0.0391
	(0.1700)	(0.0595)	(0.1700)	(0.0594)	(0.1800)	(0.0614)	(0.0934)**	(0.0327)**	(0.0934)**	(0.0328)*	(0.1134)	(0.0416)
Academy	0.3580	0.1286	0.3540	0.1274	0.3050	0.1093	0.1694	0.0622	0.1794	0.0660	0.0854	0.0316
	(0.1800)**	(0.0677)**	(0.1800)**	(0.0675)*	(0.1800)*	(0.0698)	(0.0934)*	(0.0363)*	(0.0934)*	(0.0366)**	(0.1134)	(0.0441)
University	0.3070	0.1093	0.3040	0.1082	0.2630	0.0932	0.1721	0.0631	0.1828	0.0670	0.1167	0.0433
	(0.1800)*	(0.0659)*	(0.1800)*	(0.0658)*	(0.1800)	(0.0672)	(0.0934)*	(0.0358)*	(0.0934)*	(0.0361)*	(0.1134)	(0.0442)
Village head's duration in years	-0.0014	-0.0005	-0.0014	-0.0005	-0.0020	-0.0007	-0.0005	-0.0002	-0.0006	-0.0002	-0.0003	-0.0001
	(0.0018)	(0.0006)	(0.0018)	(0.0006)	(0.0019)	(0.0006)	(0.0013)	(0.0005)	(0.0013)	(0.0005)	(0.0015)	(0.0005)
Villages with 50% or more families in pre-welfare and welfare 1 in (*t*-1) period: yes 1, no 0	-0.0815	-0.0271	-0.0776	-0.0258	-0.0772	-0.0258	0.0055	0.0019	0.0024	0.0008	0.0033	0.0012
	(0.0240)***	(0.0082)***	(0.0240)***	(0.0079)***	(0.0250)***	(0.0085)***	(0.0133)	(0.0046)	(0.0127)	(0.0045)	(0.0153)	(0.0054)
If the village had a junior high school in (*t*-1) period: yes 1, no 0	2.8410	0.8427	2.8430	0.8429	2.8460	0.8436	1.6215	0.5169	1.6208	0.5167	1.6428	0.5211
	(0.0290)***	(0.0043)***	(0.0290)***	(0.0043)***	(0.0310)***	(0.0045)***	(0.0220)***	(0.0042)***	(0.0220)***	(0.0042)***	(0.0260)***	(0.0048)***
Mean distance in district in (*t*-1) period X initial condition x 100	0.0012	0.0004	0.0025	0.0008	0.0007	0.0002	-0.0006	-0.0002	-0.0028	-0.0010	0.0045	0.0016
	(0.0032)	(0.0010)	(0.0036)	(0.0010)	(0.0033)	(0.0010)	(0.0023)	(0.0007)	(0.0023)	(0.0007)	(0.0041)	(0.0013)
Population of village in (*t*-1) period X 10^4	0.0560	0.0185	0.0557	0.0185	0.0543	0.0181	0.5449	0.1901	0.5589	0.1948	0.5496	0.1981
	(0.0240)**	(0.0001)**	(0.0240)**	(0.0001)**	(0.0240)**	(0.0001)*	(0.0520)***	(0.0001)***	(0.0520)***	(0.0001)***	(0.0580)***	(0.0001)***
If the village had any terminal/station/ port in (*t*-1) period: yes 1, no 0	0.1850	0.0641	0.1890	0.0654	0.1840	0.0640	0.1234	0.0447	1 0.1101	0.0397	0.1054	0.0390
	(0.0370)***	(0.0135)***	(0.0370)***	(0.0134)***	(0.0380)***	(0.0140)***	(0.0233)***	(0.0088)***	(0.0240)***	(0.0090)***	(0.0273)***	(0.0104)***
Village topography (hill area 0, flatland 1)	-0.0033	-0.0011	-0.0047	-0.0015	-0.0098	-0.0033	-0.0015	-0.0005	0.0073	0.0025	-0.0111	-0.0040
	(0.0260)	(0.0087)	(0.0260)	(0.0087)	(0.0270)	(0.0091)	(0.0173)	(0.0060)	(0.0167)	(0.0058)	(0.0207)	(0.0074)
Any disaster in last three years: yes 1, no 2	-0.0522	-0.0173	-0.0511	-0.0169	-0.0620	-0.0206	0.0187	0.0066	0.0204	0.0071	0.0072	0.0026
	(0.0240)***	(0.0079)**	(0.0240)**	(0.0079)	(0.0250)**	(0.0083)**	(0.0147)**	(0.0050)	(0.0133)	(0.0047)	(0.0173)	(0.0061)
Annual GRDP growth x 100					0.1840	0.0614					-0.1261	-0.0454
					(0.0460)***	(0.0150)***					(0.2134)	(0.0767)
Fixed effects included	No		Yes		No		No		Yes		No	
Observations	49,850		49,850		49,850		55,129		55,129		55,129	

Notes: Robust standard errors in parentheses. * Significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent. District-specific constants are not reported in the table. GRDP: gross regional domestic product.

Table 8a. Local preference and changes in local public goods: Healthcare infrastructure (polyclinic)

Dependent variable: change in the availability of polyclinic in village

Estimation method: ordered probit

	1996–2000						2000–2006					
	(1)		(2)		(3)		(1)		(2)		(3)	
	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects
Village head's gender in (*t*-1) period (male 1, female 0)	-0.0905 (0.0230)***	-0.0030 (0.0002)***	-0.1170 (0.0011)***	-0.0005 (0.0000)***	-0.0409 (0.0120)***	-0.0021 (0.0001)***	-0.0532 (0.0307)*	-0.0030 (0.0019)*	-0.0464 (0.0007)***	-0.0007 (0.0001)***	-0.0625 (0.0334)*	-0.0038 (0.0022)*
Percent of women voters in village X 10^2	-0.1550 (0.0450)***	-0.0047 (0.0001)***	-0.1572 (0.0023)***	-0.0006 (0.0001)***	-0.1620 (0.0240)***	-0.0049 (0.0001)***	-0.2535 (0.2335)	-0.0133 (0.0120)	-0.0045 (0.0015)***	-0.0006 (0.0001)***	-0.5950 (0.2535)**	-0.0334 (0.0140)*
Village head's age in (*t*-1) period	0.0067 (0.0005)***	0.0002 (0.0001)*	0.0062 (0.0001)***	0.0002 (0.0001)*	0.0051 (0.0003)***	0.0002 (0.0001)*	0.0036 (0.0017)**	0.0002 (0.0001)**	0.0043 (0.0001)***	0.0006 (0.0001)***	0.0060 (0.0011)***	0.0003 (0.0001)***
Village head's education in (*t*-1) period												
Not completed	-0.8060 (0.0120)***	-0.0109 (0.0041)***	-0.6037 (0.0021)***	-0.0010 (0.0001)***	0.3350 (0.0074)***	-0.0108 (0.0042)**	-0.2648 (0.1267)**	-0.0097 (0.0033)**	-0.0954 (0.0010)***	-0.0011 (0.0001)***	-0.2561 (0.1734)	-0.0101 (0.0047)*
Primary school	-0.8380 (0.0140)***	-0.0172 (0.0059)***	-0.5731 (0.0024)***	-0.0014 (0.0001)***	0.3770 (0.0087)***	-0.0163 (0.0058)**	-0.1661 (0.1201)	-0.0074 (0.0047)	0.0129 (0.0011)***	0.0018 (0.0002)***	-0.1714 (0.1734)	-0.0081 (0.0067)
Junior high school	-0.7060 (0.0160)***	-0.0161 (0.0054)***	-0.4677 (0.0024)***	-0.0013 (0.0001)***	0.4210 (0.0086)***	-0.0150 (0.0051)**	-0.1554 (0.1267)	-0.0074 (0.0055)	0.0360 (0.0013)***	0.0005 (0.0001)***	-0.1294 (0.1734)	-0.0067 (0.0082)
High school	-0.6000 (0.0160)***	-0.0162 (0.0051)***	-0.3676 (0.0025)***	-0.0012 (0.0001)***	0.4930 (0.0091)***	-0.0150 (0.0049)**	-0.1127 (0.1267)	-0.0058 (0.0063)	0.0720 (0.0013)***	0.0010 (0.0000)***	-0.0800 (0.1734)	-0.0044 (0.0093)
Academy	-0.3500 (0.0120)***	-0.0074 (0.0025)***	-0.1167 (0.0023)***	-0.0004 (0.0001)***	0.6310 (0.0066)***	-0.0067 (0.0023)**	-0.0396 (0.1334)	-0.0020 (0.0061)	0.1661 (0.0014)***	0.0031 (0.0001)***	-0.0074 (0.1734)	-0.0004 (0.0096)
University	-0.3920 (0.0140)***	-0.0081 (0.0028)***	-0.2519 (0.0020)***	-0.0006 (0.0001)***	0.5100 (0.0068)***	-0.0075 (0.0026)**	-0.0707 (0.1267)	-0.0034 (0.0057)	0.1387 (0.0017)***	0.0024 (0.0001)***	-0.0236 (0.1734)	-0.0013 (0.0090)
Village head's duration in years	-0.0007 (0.0018)	-0.0002 (0.0001)	-0.0001 (0.0001)	-0.0001 (0.0001)	-0.0001 (0.0010)	-0.0002 (0.0005)	-0.0023 (0.0023)	-0.0001 (0.0001)	-0.0014 (0.0001)***	-0.0002 (0.0001)***	-0.0043 (0.0023)*	-0.0002 (0.0001)*
Villages with 50% or more families in pre-welfare and welfare 1 in (*t*-1) period: yes 1, no 0	-0.3260 (0.0170)***	-0.0106 (0.0030)***	-0.3046 (0.0011)***	-0.0012 (0.0000)***	-0.0945 (0.0094)***	-0.0105 (0.0030)***	-0.1007 (0.0260)***	-0.0053 (0.0015)***	-0.1267 (0.0005)***	-0.0017 (0.0003)***	-0.1167 (0.0280)***	-0.0066 (0.0018)***
If the village had a polyclinic in (*t*-1) period: yes 1, no 0	-7.6600 (0.0300)***	-0.0266 (0.0092)***	-13.8217 (0.0155)***	-0.0069 (0.0002)***	-6.3100 (0.0190)***	-0.0272 (0.0097)**	-6.9635 (0.4736)***	-0.0491 (0.0033)***	-9.2246 (0.0093)***	-0.0212 (0.0004)***	-6.9501 (0.4936)***	-0.0559 (0.0041)***
If the village had a *puskesmas* in (*t*-1) period: yes 1, no 0	0.5810 (0.0170)***	0.0297 (0.0102)***	0.6037 (0.0019)***	0.0047 (0.0001)***	0.3630 (0.0083)***	0.0294 (0.0104)**	0.1694 (0.0227)***	0.0109 (0.0019)***	0.2321 (0.0021)***	0.0045 (0.0001)***	0.1848 (0.0240)***	0.0128 (0.0023)***
Population of village in (*t*-1) period X 10^4	0.0703 (0.0028)***	0.0021 (0.0001)***	0.0458 (0.0004)***	0.0006 (0.0001)***	0.0379 (0.0014)***	0.0021 (0.0001)**	0.6443 (0.0634)***	0.0339 (0.0001)***	0.4442 (0.0016)***	0.0060 (0.0001)***	0.5890 (0.0667)***	0.0331 (0.0001)***
If the village had any terminal/station/ port in (*t*-1) period: yes 1, no 0	0.3740 (0.0150)***	0.0163 (0.0060)***	0.4022 (0.0024)***	0.0025 (0.0001)***	0.3760 (0.0081)***	0.0162 (0.0062)**	0.1067 (0.0307)***	0.0065 (0.0023)***	0.1821 (0.0021)***	0.0034 (0.0001)***	0.0900 (0.0287)***	0.0057 (0.0021)**
Village topography (hill area 0, flatland 1)	0.1600 (0.0210)***	0.0045 (0.0021)***	0.1658 (0.0010)***	0.0005 (0.0001)***	0.0306 (0.0110)***	0.0048 (0.0023)*	0.0552 (0.0327)*	0.0028 (0.0016)*	0.1141 (0.0007)***	0.0014 (0.0001)***	0.1014 (0.0313)***	0.0053 (0.0017)**
Any disaster in last three years: yes 1, no 2	-0.0419 (0.0170)***	-0.0013 (0.0001)***	0.0476 (0.0007)***	0.0017 (0.0001)***	0.0058 (0.0091)	-0.0011 (0.0001)***	-0.0175 (0.0200)	-0.0009 (0.0010)	0.0064 (0.0006)***	0.0009 (0.0001)***	-0.0047 (0.0220)	-0.0003 (0.0012)
Annual GRDP growth x 100					-0.0008 (0.0028)	-0.0025 (0.0100)					0.6390 (0.5203)	0.0359 (0.0300)
Fixed effects included	No		Yes		No		No		Yes		No	
Observations	52,127		52,127		52,127		55,129		55,129		55,129	

Notes: Robust standard errors in parentheses. * Significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent. District-specific constants are not reported in the table. GRDP: gross regional domestic product.

Table 8b. Local preference and changes in local public goods: Healthcare infrastructure (*puskesmas*)

Dependent variable: change in the availability of *puskesmas* in village

Estimation method: ordered probit

	1996–2000						2000–2006					
	(1)		(2)		(3)		(1)		(2)		(3)	
	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects
Village head's gender in (*t*-1) period (male 1, female 0)	-0.0599 (0.0120)***	-0.0007 (0.0000)***	-0.0820 (0.0010)***	-0.0007 (0.0000)***	-0.0654 (0.0240)***	-0.0005 (0.0001)***	-0.0513 (0.0093)***	-0.0006 (0.0000)***	-0.0484 (0.0087)***	-0.0006 (0.0000)***	-0.0585 (0.0107)***	-0.0006 (0.0001)***
Percent of women voters in village X 10^2	0.1660 (0.0230)***	0.0019 (0.0010)***	0.1700 (0.0231)***	0.0018 (0.0010)*	0.1610 (0.0470)***	0.0018 (0.0010)***	-0.4909 (0.0180)***	-0.0054 (0.0013)***	-0.4215 (0.0180)***	-0.0046 (0.0007)***	-0.2628 (0.0207)***	-0.0024 (0.0007)***
Village head's age in (*t*-1) period	0.0054 (0.0003)***	0.0006 (0.0002)***	0.0051 (0.0001)***	0.0006 (0.0002)***	0.0068 (0.0005)***	0.0006 (0.0001)***	0.0032 (0.0002)***	0.0003 (0.0001)***	0.0032 (0.0002)***	0.0003 (0.0001)***	0.0023 (0.0002)***	0.0002 (0.0001)**
Village head's education in (*t*-1) period												
Not completed	0.2790 (0.0069)***	0.0046 (0.0010)***	0.2756 (0.0015)***	0.0047 (0.0012)***	-0.7940 (0.0130)***	0.0058 (0.0013)***	-0.0171 (0.0051)***	-0.0018 (0.0002)***	0.0101 (0.0050)**	0.0001 (0.0001)**	0.0650 (0.0057)***	0.0007 (0.0003)***
Primary school	0.3290 (0.0083)***	0.0048 (0.0011)***	0.3620 (0.0020)***	0.0050 (0.0013)***	-0.7870 (0.0150)***	0.0056 (0.0013)***	0.0056 (0.0061)	0.0001 (0.0001)	0.0393 (0.0061)***	0.0005 (0.0002)***	0.0516 (0.0062)***	0.0005 (0.0002)**
Junior high school	0.3680 (0.0082)***	0.0054 (0.0012)***	0.4192 (0.0023)***	0.0056 (0.0014)***	-0.6480 (0.0160)***	0.0063 (0.0014)***	0.0169 (0.0065)***	0.0002 (0.0001)***	0.0583 (0.0063)***	0.0007 (0.0002)***	0.0637 (0.0080)***	0.0006 (0.0003)**
High school	0.4430 (0.0087)***	0.0061 (0.0013)***	0.5082 (0.0023)***	0.0063 (0.0016)***	-0.5490 (0.0170)***	0.0068 (0.0015)***	0.0601 (0.0063)***	0.0007 (0.0002)***	0.0980 (0.0061)***	0.0011 (0.0004)***	0.1227 (0.0073)***	0.0012 (0.0004)**
Academy	0.5920 (0.0064)***	0.0143 (0.0028)***	0.6579 (0.0020)***	0.0147 (0.0033)***	-0.3020 (0.0130)***	0.0157 (0.0032)***	0.0934 (0.0053)***	0.0012 (0.0004)***	0.1254 (0.0051)***	0.0017 (0.0005)***	0.1574 (0.0063)***	0.0019 (0.0007)***
University	0.4640 (0.0065)***	0.0094 (0.0019)***	0.5219 (0.0025)***	0.0097 (0.0023)***	-0.3480 (0.0140)***	0.0107 (0.0023)**	0.0974 (0.0061)***	0.0013 (0.0004)***	0.1307 (0.0060)***	0.0018 (0.0005)***	0.1688 (0.0073)***	0.0020 (0.0007)***
Village head's duration in years x 100	0.0482 (0.0940)	0.0005 (0.0010)	0.2100 (0.0100)***	0.0006 (0.0001)	-0.0727 (0.1900)	-0.0001 (0.0010)	0.0018 (0.0667)	0.0002 (0.0007)	-0.0321 (0.0667)	-0.0004 (0.0007)	0.0021 (0.0008)**	0.0002 (0.0001)
Villages with 50% or more families in pre-welfare and welfare 1 in (*t*-1) period: yes 1, no 0	-0.0979 (0.0090)***	-0.0011 (0.0001)***	-0.1270 (0.0007)***	-0.0012 (0.0002)***	-0.3240 (0.0170)***	-0.0011 (0.0001)***	-0.0413 (0.0065)***	-0.0005 (0.0001)***	-0.0462 (0.0064)***	-0.0005 (0.0001)***	-0.0289 (0.0073)***	-0.0003 (0.0000)***
If the village had a *puskesmas* in (*t*-1) period: yes 1, no 0	-6.3060 (0.0180)***	-0.0257 (0.0045)***	-11.0578 (0.0124)***	-0.0257 (0.0052)***	-7.7210 (0.0300)***	-0.0255 (0.0047)***	-4.2568 (0.0113)***	-0.0173 (0.0035)***	-4.2741 (0.0113)***	-0.0172 (0.0038)***	-4.2988 (0.0147)***	-0.0159 (0.0042)***
If the village had a polyclinic in (*t*-1) period: yes 1, no 0	0.3400 (0.0080)***	0.0059 (0.0013)***	0.2839 (0.0027)***	0.0060 (0.0015)***	0.5770 (0.0170)***	0.0064 (0.0015)***	0.0874 (0.0073)***	0.0011 (0.0004)***	0.0887 (0.0067)***	0.0011 (0.0004)***	0.0794 (0.0087)***	0.0008 (0.0003)**
Population of village in (*t*-1) period X 10^4	0.0392 (0.0014)***	0.0004 (0.0001)***	0.0392 (0.0014)***	0.0004 (0.0000)***	0.0683 (0.0028)***	0.0004 (0.0001)***	0.2208 (0.0087)***	0.0024 (0.0001)***	0.2308 (0.0087)***	0.0025 (0.0002)***	0.2555 (0.0100)***	0.0023 (0.0001)***
If the village had any terminal/station/ port in (*t*-1) period: yes 1, no 0	0.3660 (0.0078)***	0.0064 (0.0014)***	0.3673 (0.0021)***	0.0063 (0.0016)***	0.3720 (0.0160)***	0.0066 (0.0015)***	0.1834 (0.0065)***	0.0028 (0.0008)***	0.1681 (0.0063)***	0.0025 (0.0007)***	0.1554 (0.0080)***	0.0019 (0.0007)***
Village topography (hill area 0, flatland 1)	0.0329 (0.0100)***	0.0004 (0.0002)***	0.0442 (0.0009)***	0.0004 (0.0002)*	0.1730 (0.0210)***	0.0003 (0.0002)*	0.0140 (0.0080)*	0.0002 (0.0001)	0.0249 (0.0073)***	0.0003 (0.0001)*	0.0242 (0.0093)***	0.0002 (0.0001)***
Any disaster in last three years: yes 1, no 2	0.0124 (0.0088)	0.0001 (0.0001)	0.0061 (0.0006)***	0.0001 (0.0001)	-0.0360 (0.0170)	0.0001 (0.0001)	0.0282 (0.0065)***	0.0003 (0.0001)***	0.0296 (0.0063)***	0.0003 (0.0002)**	0.0337 (0.0073)***	0.0003 (0.0002)***
Annual GRDP growth x 100					-0.0830 (0.0032)***	-0.0008 (0.0001)***					-0.1974 (0.0587)***	-0.0018 (0.0001)***
Fixed effects included	No		Yes		No		No		Yes		No	
Observations	49,850		49,850		49,850		55,082		55,082		55,082	

Notes: Robust standard errors in parentheses. * Significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent. District-specific constants are not reported in the table. GRDP: gross regional domestic product.

6. CONCLUSION

We herein examine the impact of the recent governmental decentralization in Indonesia on local infrastructure provision, controlling for unobserved heterogeneity and initial conditions. The decentralization of decisionmaking powers to local authorities in Indonesia has made local public infrastructures dependent on local government jurisdictions. The preexistence of horizontal inequality among local government jurisdictions allows for the possibility of divergence in local public good provision. In addition, decentralization allows local preferences to influence local public goods provision. If, for instance, women as a group prefer one particular public good over other alternatives, the preferred good may be more likely to receive financing under post-decentralization.

To model the dynamics of public goods provision, we make public goods state-dependent by conditioning the supply of public goods in period t on the lagged public goods stocks in period (t - 1). The availability of pre- and post-decentralization period data at the level of local government jurisdictions facilitates this empirical exercise. In addition, the availability of information on *desa*-level income indicators and the relevant characteristics of the *desa* administrators and voters allows us to account for local-level resources and preferences.

The empirical findings of this paper support the notion that decentralization has linked local public goods to local income, in that the availability of local roads, schools, and healthcare facilities at the *desa* level depends on local income. Despite the transfer of grants from the central government to the district governments following decentralization, local public goods still depend on local resource availability, and poorer localities have fewer public goods than richer localities. This finding remains valid even after we control for district-fixed effects.

Contrary to our expectations, decentralization in Indonesia appears to have *improved* the availability of local public goods across rich and poor localities. Although there are cross-jurisdictional differences, the examined measures appear to be converging to similar levels of access to local public goods. This may be due to the interjurisdictional competition and efficiency gains that economists have long argued should occur in decentralized states, the increased accountability of government bureaucrats, and/or decreases in capture by local elites.

Given resource availability, the supply of some of the public goods considered herein also depends on local preferences. We find that female *desa* heads and female voters have a strong preference for local road improvements. However, the preferences are less clear for educational and healthcare infrastructures; there might be spillover, coordination, and free-riding problems that future studies need to account for.

Our results in the context of the Indonesian experience suggest that the decentralization and democratization trends currently being observed in many developing countries may be viewed with cautious optimism. The devolution of decisionmaking power and local public goods delivery to local government jurisdictions can enhance efficiency and match local preferences compared to provision through a centralized system. However, for some public goods (for example, education and healthcare), local authorities may not have sufficient capacity and/or may require interjurisdictional coordination to capture spillovers.

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